

**Before the
Federal Communications Commission
Washington DC 20554**

In the Matter of)	
)	
Expanding Flexible Use in Mid-Band Spectrum)	GN Docket No. 17-183
Between 3.7 and 24 GHz)	

**Reply Comments of
Cisco Systems, Inc.**

Executive Summary

Cisco Systems, Inc. is part of a coalition of companies that today are filing a framework for unlicensed use of the 6 GHz band, a framework that is also articulated in the reply comments of the Wi-Fi Alliance. Cisco files separately to offer the Commission a list of questions that should be included in the Notice of Proposed Rulemaking. The questions are intended to aid the Commission in collecting as complete a record as possible -- particularly as to the proposal to allow fixed unlicensed access points to operate outdoors in the 5.925-7.125 GHz band.

In addition, Cisco supports the proposal brought forward by Intel and Intelsat for 3.7-4.2 GHz. A flexible market-based incentive approach will enable speedy resolution of contentious technical issues between earth station operators in the C-band and new terrestrial interests over terrestrial use of 3GPP technologies in a band populated by satellite downlink facilities. Cisco believes this approach would speed utilization of the band, putting the US in a stronger position to be the locus of innovation for 5G in mid-band spectrum.

Finally, Cisco notes that due to likely channelization of the 6 GHz band by IEEE 802.11 technologies, the 7.125-7.250 GHz band would not be utilized by unlicensed radios. That band is presently the home of federal systems. However, Cisco does not believe this band is fully utilized by federal assignments and there may be opportunities to utilize spectrum for commercial purposes. Cisco therefore requests that the Commission confer with NTIA during the next calendar year on this band to determine if spectrum opportunities might exist. If there is spectrum availability, Cisco recommends that the Commission consider a site-licensed Part 101 approach with rules that would allow licensees, including enterprise licensees, to utilize the band for applications requiring a high level of resiliency and robustness of the type needed for new forms of industrial automation and the application of the Internet of Things (IoT).

Enterprises increasingly are asking for radio systems supporting deterministic radio links – not simply high quality of service availability, but also supporting packet delivery that delivers packets within a stated bound of time and a stated bound of jitter. Technology neutral rules should draw from Part 15 U-NII rules, be sufficiently flexible to allow IEEE 802.11 technologies to operate in the band subject to the site license, give the licensee priority spectrum rights except with respect to federal assignments, and to be available for indoor and outdoor purposes. Similar to the existing database approach for commercial links in the 70/80 GHz band, site licenses would not be available if commercial operations would interfere with federal transceivers. Part 101 transmitters would periodically have to check in with a database to determine if operations continued to be permitted, and licensees would have to adjust operations if federal usage changed. Cisco believes this opportunity is important for a variety of sectors of the economy and directly addresses US competitiveness. In addition, federal users would have new opportunities to use low-cost commercial off the shelf technology to meet their needs.

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I. Introduction and summary

Cisco Systems, Inc. (“Cisco”) is pleased to offer reply comments in the above-captioned docket, and to further support views expressed in the record that the Commission should proceed to a Notice of Proposed Rulemaking (“NPRM”) for both the 3.7-4.2 GHz band flexibly licensed terrestrial services and the 5.925-7.125 GHz band for unlicensed. Cisco is part of a coalition of companies that today are filing a framework for unlicensed use of the 6 GHz band, a framework that is also articulated in the reply comments of the Wi-Fi Alliance (“WFA”).¹ Cisco files separately to offer the Commission a list of questions that should be included in the NPRM that are intended to aid the Commission in collecting as complete a record as possible particularly as to the proposal to allow fixed unlicensed access points to operate outdoors in the 5.925-7.125 GHz band.

¹ Reply Comments of Apple, Inc., Broadcom Corporation, Cisco Systems, Inc., Facebook, Inc., Google, Inc., Hewlett-Packard Enterprise, Intel Corporation, Mediatek, Inc., Microsoft Corporation, and Qualcomm Incorporated; Reply Comments of the Wi-Fi Alliance.

In addition, these reply comments support the proposal brought forward by Intel and Intelsat to use a flexible market-based incentive approach that will resolve contentious technical issues between earth station operators in the C-band and terrestrial interests over terrestrial use by 3GPP technologies to a band historically populated by satellite downlink facilities. Cisco believes this approach will speed utilization of the band, and put the US in a stronger position to be the locus of innovation for 5G in mid-band spectrum.

Finally, Cisco notes that due to likely channelization of the 6 GHz band by IEEE 802.11 technologies, the 7.125-7.250 GHz band would not be utilized. That band is presently the home of federal systems. However, Cisco does not believe this band is fully utilized by federal assignments and there may be opportunities to utilize spectrum for commercial purposes. Cisco therefore requests that the Commission confer with NTIA during the next calendar year on this band to determine if spectrum opportunities might exist. If there is spectrum availability, Cisco recommends that the Commission consider a site-licensed Part 101 approach with rules that would allow licensees, including enterprise licensees, to utilize the band for applications requiring a high level of resiliency and robustness of the type needed for new forms of industrial automation and the application of the Internet of Things (“IoT”).

Technology neutral rules should draw from Part 15 U-NII rules, be sufficiently flexible to allow IEEE 802.11 technologies to operate in the band subject to the site license, give the licensee priority spectrum rights except with respect to federal assignments, and be available

for indoor and outdoor purposes. Similar to the existing database approach for commercial links in the 70/80 GHz band, site licenses would not be available if commercial operations would interfere with federal transceivers. Part 101 transmitters would periodically have to check in with a database to determine if operations continued to be permitted, and licensees would have to adjust operations if federal usage changed. Cisco believes this opportunity is important for a variety of sectors of the economy and directly addresses US competitiveness. In addition, federal users would have new opportunities to use low cost commercial off the shelf technology to meet their needs.

II. For both 3.7-4.2 GHz and 5.925-7.125 GHz, issues move from “whether to consider these bands” to “how can new uses be introduced”

A. 5.925-7.125 GHz for unlicensed

There is strong record support for proceeding to an NPRM for 5.925-7.125 GHz contingent on the on the need for technical analyses that demonstrates that the existing users would not receive harmful interference from unlicensed users. Interest in opening the band for unlicensed use is broad, and there is significant support across the unlicensed industry for opening the entire band, from 5.925 to 7.125 GHz, for unlicensed.² Virtually every large

² Apple Ex Parte, GN Docket No.17-183, filed September 19, 2017; Broadcom Ltd. Comments, GN Docket No. 17-183, filed Oct. 2, 2017; Cisco Systems, Inc. Comments, GN Docket No. 17-183, filed Oct. 2, 2017; Dynamic Spectrum Alliance, GN Docket No. 17-183, filed Oct. 2, 2017; IEEE 802 Comments, GN Docket No. 17-183, filed Oct. 2, 2017; Intel Corporation Comments, GN Docket No. 17-183, filed Oct. 2, 2017; Microsoft Corporation, GN Docket No. 17-183, filed Oct. 2, 2017; Wi-Fi Alliance Comments, GN Docket No. 17-183, filed Oct. 2, 2017; Joint Comments of All Points Broadband, Amplex Internet, Apple, Blaze Broadband, Broadcom, Cambium Networks, Cisco Systems, Cypress Semiconductor, Dell, Extreme Networks, Facebook, Fire2Wire, Google, Hewlett-Packard Enterprise, HP, Intel, Joink, Mediatek, Metalink

corporation with a strong interest in unlicensed technology has expressed a desire to open the entire band, and to work sharing issues both with the Commission and with incumbents.

Unlicensed interests view the 6 GHz band as an opportunity to extend technology from the 5 GHz to the 6 GHz band, thereby enabling users to take advantage of more channels.³ But more fundamentally, unlicensed proponents consistently articulate a need for more spectrum to support growing dependence on what has become the largest commercial wireless ecosystem measured by packets transmitted.⁴ Cisco agrees. Based on our traffic projections in the Visual Networking Index (VNI), in the United States, Fixed/Wi-Fi IP traffic will reach 34.0 Exabytes⁵ per month in 2021, up from 10.9 Exabytes per month in 2016.⁶ The sheer numbers alone, coupled with a desire to continue to maintain US leadership in the unlicensed industry, support a Commission examination of the entire 5925-7125 MHz band for unlicensed.

Technologies, Microsoft, New Wave Net, Pixius Communications, Qualcomm, Rise Broadband, Ruckus – a unit of Brocade, Snappy Internet, Sony Electronics, Western Broadband, Wireless Internet Service Provider Association (WISPA), Wisper ISP, GN Docket No. 17-183, filed Oct., 2, 2017 (hereinafter Joint 6 GHz Commenters”).

³ Broadcom Comments, GN Docket No. 17-183 at 9 (“Wi-Fi throughout the 6 GHz band could be integrated into unified 5/6 GHz chipsets”); Qualcomm Comments, GN Docket No. 17-183 at 9-10; Joint 6 GHz Commenters, GN Docket No. 17-183 at 19; Wi-Fi Alliance Comments, GN Docket No. 17-183 at 7.

⁴ Joint 6 GHz Commenters, GN Docket No. 17-183 at 3-4, 5-10; Cisco Comments, GN Docket No. 17-183 at 5; Wi-Fi Alliance Comments, GN Docket No. 17-183 at 3-6.

⁵ See “The Byte Scale” at https://www.cisco.com/c/dam/assets/sol/sp/vni/qa_c67-482177-1.jpg.

⁶ *Compare* US Mobile IP traffic, which Cisco projects will reach 5.6 Exabytes per month in 2021, up from 1.3 Exabytes per month in 2016. Moreover, the Fixed/Wi-Fi statistic above does not measure the role Wi-Fi plays in mobile offload. Taking mobile offload into account, of all IP traffic (fixed and mobile) in 2021, 50% will be Wi-Fi, 41% will be Wired, and 9% will be mobile. Source: <https://www.cisco.com/go/vni>

At this very early stage in the proceeding, Cisco is pleased to see many parties willing to have a discussion of *how* unlicensed use might work.⁷ These questions of “how” will be answered in this proceeding based on a mix of three components: (1) studies showing the effect of introducing unlicensed into the band (2) a set of proposed rules that specify the emissions parameters of the devices, type of devices, and antenna gains for unlicensed spectrum and (3) other mitigations specific to protecting 6 GHz incumbents.

The rules framework proposals contained in the Coalition and WFA filings represent the unlicensed industry’s efforts to begin to put some flesh on the bones of how unlicensed spectrum allocation and use might work. At this stage, the framework already evidences an

⁷ Charter Communications Comments, GN Docket No. 17-183, filed Oct. 2, 2017 at 2 (“the Commission should compile a complete record to demonstrate that new operations will fully protect existing satellite and CARS users from harmful interference”); NCTA Comments, GN Docket No. 17-183 (provided that incumbent operations can be fully protected); American Association of State Highway and Transportation Officials, GN Docket No. 17-183, filed Oct. 2, 2017 (“[t]here may be techniques that could mitigate interference,” suggestion power levels but also noting concerns with outdoor transmissions that could raise the noise floor); State of Maryland Comments, filed Oct. 2, 2017 (noting the need to treat licensed fixed services as primary). A number of other parties who conditionally supported unlicensed operations up to 6425 MHz also agree that there is room for a discussion of unlicensed, provided the end result is protection of incumbents. *See, e.g.*, Ericsson Comments, GN Docket No. 17-183 at 9; T-Mobile Comments, GN Docket No. 17-183 at 16; CTIA Comments, GN Docket No. 17-183 at 15-17; Verizon Comments, GN Docket No. 17-183 at 21.

acute awareness of the incumbent operations in the various portions of the band, and the need to defer to them.

For example, unlicensed proponents are seeking to use the band for both indoor and outdoor use in a manner consistent with 5 GHz rules, but the framework proposal does not include a request to operate outdoors in the U-NII-6 band, or 6425-6525 MHz. That band is heavily utilized by the Broadcast Auxiliary Service (“BAS”) and Cable Relay Television Service (“CARS”) licensees for mobile uses, as well as public safety. In addition, there is uncertainty with respect to link lengths of the incumbents, as that data is not as well populated in the Commission’s licensing databases. The framework proposal, therefore, reflects the data that is presently available, and that data argues for a conservative approach to sharing proposals. In Cisco’s view, while there may be mechanisms that can be created to coexist with these 6425-6525 MHz licensees, there will likely need to be more extensive mitigations than in U-NII-5 and U-NII-7. Given the limited amount of spectrum that would reasonably be expected to become available once those mitigations are in place, the cost may not be worth the benefit.⁸

That same question underlies the framework’s position on U-NII-8 (frequencies). Here, the BAS and CARs uses may not be as extensive as U-NII-6, the band is larger, and the cost of

⁸ Of course, the decision to not pursue U-NII-6 for outdoor access points does have costs for unlicensed, namely that the spectrum sits astride two 80-MHz wide 802.11 channels that outdoor devices will not be able to use. It may be that after the Commission considers more fully the mitigations proposed for U-NII-5, U-NII-7, and U-NII-8, there may be an opportunity in the future to return to the question of U-NII-6 for outdoor fixed use, particularly if the license databases maintained by the Commission can be made more complete and accurate. This could enable effective sharing of the band without fear of harmful interference.

mitigations may very well be a price worth paying for outdoor use. Hence, the framework includes U-NII-8 in the list of bands available for outdoor use, but subject to additional analysis.

In addition, for high power fixed access points operating outdoors, the framework calls for an automated mechanism (the details of which are to be determined) that would ensure higher powered outdoor devices are not placed in proximity to incumbent transceivers such that harmful interference would result. Meanwhile, low power fixed outdoor as a category has been introduced and shaped for regulatory purposes as something that would operate as an adjunct to an indoor system (e.g., restaurant patio, garden center), and is proposed at power levels below those of indoor fixed devices and with antenna security provisions that ensure these devices will be deployed in their intended use case. Finally, the outdoor fixed transmitters – regardless of power level – would transmit identifying information which is intended to assist others in identifying an interference source. In the unlicensed community's view, these proposals were necessary to protect incumbents. The subsequent debate – to include engineering studies, further elaboration of proposed rules, and other record evidence – will determine whether they are sufficient.

In Cisco's view, the framework proposal is an essential first step toward engaging the technical questions that will have to be examined and resolved before the unlicensed use proposed for 6 GHz can be finalized. The framework is also a useful approach to begin to understand what proposed rules might look like. Nevertheless, for outdoor fixed access points, Cisco believes there are a series of additional questions that should be posed in a future NPRM

to elicit the fullest record possible from industry. Fixed outdoor access points are an obvious concern due to the potential outdoor use poses to incumbents, as many commenters indicated. With respect to these devices, Cisco does not believe the framework by itself exhausts the questions the Commission should ask in an NPRM with respect to mitigations that outdoor fixed access points might enable. In our view, the NPRM should also include questions on the following topics with respect to outdoor fixed access points and their ability to contribute to an improved sharing environment.

1. How can energy avoidance operate as a mitigation? IEEE 802.11 5 GHz U-NII devices have the ability to listen in the background to other channels that the device might use. Indeed, the use of the radar bands at 5 GHz requires this capability to be present for the purpose of detecting radar pulses. Should the ability to listen in the background to other channels be a requirement for operation of outdoor fixed access points in the 6 GHz band? Should the outdoor fixed access point have a map of a few channels with measured radio energy, or should it map all channels that it supports? Should the outdoor fixed access point have the capability to avoid the noisiest channels? How might these requirements be utilized to help avoid incumbents in the band? To the extent an outdoor fixed access point detects radio energy on other channels, should the outdoor fixed access point in the 6 GHz band have the capability to blacklist channels (i.e., list frequencies that are prohibited for operation) to avoid that energy? With respect to the questions in this paragraph, these approaches would appear to mitigate RLAN energy in the presence of Fixed Services and Fixed Satellite Services stations regardless of emissions characteristics.

2. Will 6 GHz outdoor fixed access devices support more than one U-NII band? For example, should outdoor fixed access point devices be required to support U-NII-3 in addition to one or more the U-NIIs in the 6 GHz range? Should outdoor fixed access point devices be required to support at least 600 MHz of spectrum such that any single band can be removed from a whitelist (i.e., frequencies are allowed to be used)? If so, could the device scan more than one band in the background?

3. Should there be a time limit for how long a 6 GHz outdoor fixed access point occupies a channel, followed by a required and known channel change? What is the burden on the device if a known channel change is required? Would that known channel change disrupt client communications,

applications and/or make the unlicensed connectivity less desirable to users? What would the time limit be (e.g., one hour)? Should there be a corresponding channel non-occupancy protocol? Would channel changes assist the interference environment by ensuring that devices are continually seeking quieter channels?

4. Should there be a capability when using outdoor fixed devices to log and maintain a short term (e.g., a few days) “history” of channels that the outdoor fixed devices have utilized? While this is not a standards-based capability of the devices themselves, most network management facilities applicable to outdoor fixed networks do log and maintain history of operation. Are these network management facilities in widespread use? Who can obtain access to that data? How long is it maintained? Does a record of channels used help in resolving cases of interference?

5. In addition, the framework proposal calls out the issue of transmission of unique identifying information by outdoor fixed access points, which under IEEE 802.11y and IEEE 802.11af standards would be part of the beacon and transmitted in the open. How often should that unique identifying information be transmitted? A constant stream of identifying information would appear unnecessary. What is a reasonable approach that would allow an interference hunter to capture the identifying information efficiently? When an outdoor fixed device changes channels, should the initial beacon on the new channel include that identifying information?

6. With respect to proposal to transmit the unique identifying information, standards do not specify any particular format. However, the standards are flexible in terms of the amount of data that the identifier could contain. Should there be requirement to include license-like information (i.e., that which is contained in FCC records concerning the licensed entity) included in the unlicensed beacon?

7. The framework suggests that the unique identifying information could include a geotag that, in the event of interference, would assist in tracking down the offending transceiver. How accurate should that geotag be? Are there privacy, security or safety issues associated with precision of the geotag? How would a victim use the unique identifier and geotag to identify a responsible person controlling the offending transmitter?

8. The framework proposes an automated mechanism to inform high power access points whether there is an incumbent transceiver nearby. The mechanism would be utilized to inform both the installer and, subsequently the operator, should there be a license modification or new license granted. A third party database might be one approach. Different databases now in use

essentially call upon the covered equipment to pose somewhat different questions to the database. Is the question here: “These are my emissions characteristics. May I operate here?” Is there any need for the database operator to have continuous knowledge of U-NII operations, such as what occurs for PALs or GAA transmitters in the Citizens Band Radio Service at 3.5 GHz? How often should the device be required request permission? Should the database also be able to offer known available channels for the next few months based on FCC records? Is there any other way for the database to be informed from the frequency coordinators about channels that will be in use in the future?

9. Alternatively, if a 3rd party database is not used, could manufacturers of fixed outdoor devices be responsible for providing permission to operate? This option might be attractive for enterprise cloud-based deployments. If this method is used, and there is no third party database operator to be approved by the Commission, how would the Commission know if the manufacturer is providing the necessary and sufficient information? What would be the remedy if they were not doing so? Can enterprise cloud-based deployment operators contract with a third party database operator so that the database operator provides its information to the cloud operator?

10. The Auto Alliance comments raise an important question about adjacent channel interference into planned use of the 5.9 GHz band for vehicle to vehicle safety and other vehicle to infrastructure safety applications.⁹ To what extent does an unlicensed channel plan starting at 5935 MHz resolve adjacent channel interference concerns? To what extent does the framework’s proposal to use OOB limits borrowed from U-NII-3 resolve these concerns?

B. 3.7-4.2 GHz for flexible terrestrial mobile

There is strong record support for proceeding to an NPRM to open the 3.7-4.2 GHz band to terrestrial mobile use. As commenters note, this band is very important as it is part of, and sits adjacent to, 3 GHz spectrum that is being opened on a global basis for 5G technologies.¹⁰

⁹ Alliance of Automobile Manufacturers Comments, GN Docket No. 17-183, filed Oct. 2, 2017.

¹⁰ CTIA Comments, GN Docket No. 17-183, filed Oct. 2, 2017 at 6-7.

For the US to take full advantage of 5G technologies operating in the mid-band range, it is imperative to find more mid-band spectrum beyond the Citizens Band Radio Service for operators to use. It is no exaggeration to say that time is of the essence. As has repeatedly been acknowledged, the US was the locus of technology innovation for 4G because the Commission moved first to open spectrum. We need to do the same for mid-band spectrum for 5G. Cisco therefore encourages the FCC to move to an NPRM on this spectrum as promptly as possible.

In addition, the record to date has produced two ideas for moving forward with the introduction of terrestrial mobile into a band that is today used by satellite downlink.¹¹ In Cisco's view, it is clear that 3.7-4.2 GHz is about modifying how satellite downlink uses the band, either by having satellite operators move operations to other bands, utilizing fewer frequencies, and/or moving downlink operations to locations away from terrestrial uses. As a result, there will be a large number of highly technical issues that will need to be resolved. The two proposals essentially boil down to this – who is best positioned to be the decider, the Commission or private parties?

While ultimately, both the Commission and private parties would resolve the complex issues involved in migrating the band to allow for terrestrial mobile use, having the Commission design and then run a public auction will likely take significantly longer than private party

¹¹ T-Mobile Comments, GN Docket No. 17-183, filed Oct. 2, 2017; Joint Comments of Intelsat Licensee and Intel Corporation, GN Docket No. 17-183, filed Oct. 2, 2017.

negotiation. For that reason, Cisco believes the flexible, market-based approach outlined by Intel and Intelsat appears to be better approach in that it will put 5G mid-band services to work for consumers with greater speed than the auction proposal.

III. 7.125-7.250 GHz site licensing

The spectrum in this band will, if the Commission adopts the recommended allocation for unlicensed devices, be adjacent to frequencies utilized by unlicensed technologies. However, the spectrum is unlikely to be exploited by those unlicensed technologies as it does not easily fit within a likely channel plan for the 6 GHz band. For example, no commenter seeking unlicensed use of the 6 GHz band has asked for spectrum above 7.125 GHz. At present, the band is utilized by federal systems, although not much is known publicly about the number of systems or how widespread their use of the band might be.

Juxtaposed against what may be an under-utilized band at 7.125-7.250 GHz is a growing need on the part of enterprises of all types – public and private – to find a way to affirmatively manage spectrum in support of applications that require resiliency and robustness. Many of them would like to do so using unlicensed technology, but using unlicensed technology in a “commons” such as 2.4 GHz or 5 GHz does not permit spectrum management.¹² While the

¹² See, e.g., Marriott International and Marriott Hotel Services, File No.: EB-IHD-13-00011303, Order, released Oct. 3, 2014 (enterprises are violating federal requirements preventing jamming when they block consumers from using commons spectrum to access the Internet); Smart City Holdings LLC and its wholly owned subsidiaries Smart City Networks LP and Smart City Solutions LLC, Order, released August 18, 2015. Both these enforcement cases involved defendants who, upon blocking consumer operated hot spots, directed consumer devices to an alternative paid access service.

Commission has yet to adjudicate a case involving an enterprise's attempt to manage commons spectrum on its premises in the absence of any attempt at charging consumers for services, its 2016 Enforcement Advisory simply called out as illegal: "The use of authorized Wi-Fi equipment to intentionally disrupt the lawful operation of neighboring Wi-Fi networks."¹³ That broad statement would appear to negate an enterprise's attempts to use management tools to stop its employees or guests from using an unlicensed frequency. Yet, enterprises are increasingly turning to unlicensed wireless operations as part of their business operations at an increasing rate, in order to stay globally competitive, generate productivity gains, and improve customer experience.¹⁴ Some of these new uses are difficult to manage without the ability to manage on-premises spectrum because the use case requires a robust and resilient wireless link.

The proposal to develop 7.125-7.250 GHz as a site-licensed Part 101 band, with technical rules that would permit the use of unlicensed technology, would address a growing gap in enterprise networking that is not filled by any other allocation. While 3GPP 5G technologies will eventually be used by enterprises in the future, those use cases and business models are vastly different than what should be possible here if enterprises are allowed to manage spectrum using unlicensed technology for applications where transmissions must be resilient and robust. Enterprises increasingly are asking for radio systems supporting

¹³ FCC Enforcement Advisory, "Warning: FCC Authorized Equipment Must Be Used In Compliance With All Laws and Rules", Enforcement Advisory No. 2016-05, DA 16-588, May 26, 2016.

¹⁴ Indeed, the record amassed by the NTIA as part of its IoT inquiry demonstrates how quickly enterprises – public and private – are implementing new forms of wireless solutions. See generally <https://www.ntia.doc.gov/category/internet-things>

deterministic radio links – not simply high quality of service availability, but also supporting packet delivery that delivers packets within a stated bound of time and a stated bound of jitter. In addition, if this plan moves forward, federal users would have new opportunities to use low cost commercial off the shelf technology to meet their needs. Many commenters have stated that the future of wireless networking is licensed, unlicensed and shared spectrum. That statement is no less true for enterprises, private or public.

Cisco recommends the Commission consult with NTIA on the following proposal at some point during the next calendar year, and to the extent there appears to be spectrum availability, thereafter consider a Notice of Proposed Rulemaking. In concept, the proposal for 7.125-7.250 GHz would be as follows:

- Part 101 site licensed; eligibility not limited except by Part 101 requirements;
- Utilize Part 101 70/80 GHz approach with licensees first obtaining a national registration that conveys no mutual exclusivity; site license registration gives licensee first in time rights at its licensed and registered site with respect to subsequent Part 101 licensees;
- Federal government, as the primary rights holder, must agree to the non-federal site license prior to operations (e.g., similar to the process used today for the 70/80 GHz band); the federal government continues to have priority rights in the band; subsequent build out by federal agencies or modifications to their systems may require a registered licensee to adjust its operations;
- Indoor and outdoor categories of service are permitted provided these uses cause no harmful interference to federal systems or negatively impact federal missions;
- Technical rules for commercial use similar to Part 15 U-NII rules; and
- Use a database similar to 6 GHz (if adopted) or 70/80 GHz database to prevent interference; consider other mitigations, if adopted (see questions above) to protect federal assignments; registered licensee is obligated to check back with the database periodically to see if its operations continue to be permitted.

Cisco believes that such a framework is worthy of further discussion, and could be important to assisting in the rapid development of the Internet of Things for private companies and public agencies of all types. Conclusion

IV. Conclusion

Cisco encourages the Commission to encourage development of the mid-band spectrum at 5.925-7.125 GHz and 3.7-4.2 GHz by moving to an NPRM as soon as practicable, and to take up the use of 7.125-7.250 GHz as discussed above subsequent to considering the other bands.

Respectfully submitted,

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